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Planning and production of mathematic teaching courseware for school elementary second grade and evaluation of its effect on academic achievement (summation topic) and learner's creativity

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Abstract

The present survey has been done aiming to plan and produce mathematic courseware and evaluation of its effect on (summation topic) and the creativity of learners in elementary second grade. The mentioned courseware is based on researcher's idea and is according to the rules of learning information processing that its validity has been approved by the professionals of software teaching and its average is 83. The methodology is semi experimental and the population involves the students of the elementary second grade in city of Kamyaran in 1389-90 academic year that 36 subjects were chosen through available group's sampling. After cloning according to intelligence, gender and learning grade and by choosing the pretest – posttest plan through control group, researcher has set 19 chosen students by chance and accidently in test group and 17 students in control group, then test group was set in a process that the independent variable, that is teaching according to the courseware that saw there and in control group, the way of presenting lecture and questioning and answering, that is the usual way of teaching according to courseware was used for teaching the subjects. The achieved data through pretest and posttest was analyzed by using covariance analysis and the spss software. According to the results, the mentioned courseware has effect on curriculum development (summation topic) and the most important properties of creativity such as originality, fluency, flexibility and elaboration. It was also shown by calculating the amount of effect that 12% of variance that was the factor of summation, 22% the factor of originality, 19% the factor of fluency, 18% the factor of flexibility and 16% was the factor of elaboration, were shown by this teaching method.

Keywords: mathematic teaching, instructional design, courseware, curriculum development, creativity 1.**Introduction**

Introduction

Today instructional design is used as a very important and useful major in instructional technology. Instructional technology uses current methods in instructional designing utilization of theoretical bases of psychology of learning and educational psychology. Instructional design is the tool of teaching and instruction and causes the effectiveness of instructional materials (Reddi et al, 2003).

Now because of the importance of instructional design in better learning, the role of new instructional tools is obvious. One of these tools is courseware. Courseware is a kind of multimedia software that contains all the advantages and restrictions of teaching via computer assistance. Self-studying of courseware causes students choose the best way and method of reading substantial concepts (Chong & Palmer, 1960, according to Zamani). Tall (1993, translated by Zamani 2008) emphasizes the importance of visushows in all aspects of mathematic class and he also believes that computer is an independent source of visual and logistic pictures that facilities searching the mathematic concepts.

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An innovative class allows to his students to ask more questions. Such class allows to students to be diverted from the main process and causes innovative thinking (Wasserman, 2008). According to Runco (2007), inschools where encourage innovation and consider students innovations, they have more innovative students rather than schools that focus on students academic performance. today because of the growth of there hardworking for using innovation in these technologies. William James has talked about innovation (creativity) a century ago and assumes childhood as a source of creative thinking process (Torrance, 1993
quoted by Qasemzade). Guilford (1967, quoted by Qasemi and Oqlidos) describes convergent thinking and divergent thinking as two main kinds of human thinking, relates them to intelligence and creativity, respectively. It seems that for changing the traditional programs and driving teaching toward creative programs, the teaching environment must be purified and creative programs should be presented. Teaching and training (breeding) of each country has a basic role in improving peoples creativity, so the education system must emphasize on individuals who can solve unexpected issues in a creative way (Torrance 1995, quoted by Qasemzade) ." whatever supports and facilities learning is teaching" (Spector, 2000, p 2). Teaching and learning mathematic is not only restricted to conveying concepts and descriptions to students, but also teaching mathematic consists of improving and generalizing mathematic concepts, making relationship between students findings in order to solve problems seriously via teaching mathematic and students can solve problems themselves. They should not be like students who omit the problem itself (Beech & Awaida 1992, Moore & Clavert 2000; Blok, Oostam & Overmaat, 2002; quoted by Yavari). So, the ability to solve a problem is located in learning mathematic and it is considered as a factor that can affect learner's creativity power.

Mojde Avar (2007) in his survey "the effect of teaching mathematic via computer on students' mathematic learning" showed that using computer in teaching mathematic causes the improvement of learning mathematic. Sheikhzade and Mehrmohammadi (2006) in a survey titled "designing and production of mathematic software according to structuralism and its effectiveness "found that the designed software affects the amount of students' academic achievement. According to creativity variable, Ahmadpour (2009) showed that creativity can be evaluated through mathematic. Also Lio (quoted by Asadi, 2010), in searching the effects of self- learning hypermedia on creative thinking of school's elementary student found that marks had increased after that creativity test of treatment group was taken in order to compare it with control group, that is the marks of four factors**:** fluency, flexibility, Originality and expansion were evaluated meaningfully in treatment group. In another survey by Kalin, T & Mc Kata (2001, quoted by Asadi 2010), the effect of simulation software on learning and teaching creativity has been analyzed and the results showed that using these soft ware's affects two dimensions of creativity, i.e. flexibility and fluency. In this field, one can consider Kazemi (1383) that is about "the effects of teaching via multimedia software and teaching via presenting lecture in mathematic course on students' creativity growth ", so that multimedia software can improve the creativity and innovation of students. Now, according to previous surveys and the importance of mentioned data in this survey, after designing and production of mathematic course wares, the researcher analyzes its effect on academic achievement and creativity of learners, because present tools copy cat teachers function and do not consider intelligence and creativity position. In this survey, researcher considers the aspects of creativity in mathematic teaching course ware and has suggested following hypothesis:

- Analyzing the effect of mathematic instructional course ware on increase amount of learners' academic achievement (addition issue).
-Analyzing the effect of mathematic instructional course ware on increase amount of learners originality.
-Analyzing the effect of mathematic instructional course ware on increase amount of learners fluency.
-Analyzing the effect of mathematic instructional course ware on increase amount of learners flexibility.
-Analyzing the effect of mathematic instructional course ware on increase amount of learners elaboration.

2.Methodology

The method that is used in this survey is a quasi-experimental method of **"**pretest and post test in control group". Population of this survey consists of all female students of elementary schools second grade in 1389-90 academic year in city of Kamyaran, and the number of them is equal to 323 persons. According to principle of assignment in both treatment and control group, a class with 17 students was chosen a control group and a class with 19 students was chosen as treatment group. First, the raven test was taken by children so that all subjects were identified as persons with equal level. This test is creditable and also is identified as one of the useful tests for analyzing IQ (Raven, 2000). Then Torrance creativity questionnaire (visual form A) and teacher centered test of

mathematic was applied for both of the groups. After that, group learnt the lessons of mathematic course ware through common method of presenting lecture and asking and answering questions and treatment group learnt their course ware through usage of computer aid equipments that were prepared for them. The duration of teaching was 10 sessions and each session lasted 45 minutes and also control group spent their time for learning. Finally, Torrance creativity questionnaire and mathematic test were applied for both of groups.

Data collecting tools and their creditability

Visual form A of Torrance creativity questionnaire is used for preschool to postgraduate students and is formed of three activities. These activities at the same time analyze four principles of originality, expansion, flexibility, and fluency (Torrance 1990, translated by Karami Ahmadi, 2000). Reliability coefficient of test is

\reported as 63% at alpha level has 1% is meaningful (Imami pour, 2001). Reliability of tools was done through usage of correlation coefficient that achieved coefficient is equal to 61% (Bioki, 1998). A teacher centered test used as pretest and post test that are the factors of academic achievement and reliability of their content was approved by teachers and experts of teaching second grade in elementary school and its reliability was recognized by Chronbakh formula as 81%. The children's Raven test creditability was 89% to 95% and its validity domain was informed as 24% to 61% (Motamedi shark, Afrooz, 2008). The mathematic teaching course ware creditability was approved by experts in teaching soft ware's field and its average was identified as 83 of 100. The course ware mentioned here that is designed according to programed instruction method is about plus issue in elementary second grade that contains 8 lessons. So, many of students can learn individually the related material. Example, instruction and question are prepared for each lesson and the suitable feedback is given to students. (This course ware is produced by Power point, Autoplay media studio 8, BB flashback, Photoshop software)

3.Survey results

In this section, the results of survey are analyzed by descriptive and inferential statistics and covariance analysis is used for survey hypothesis test. Analyses are shown as follow:

Table1: distribution of elementary second grade students

Group	Frequency	Percent	Percent Compression
Treatment	19	52.8	52.8
Control	17	47.2	100%
	36	100%	

The facts of table 1 show that 19 students (52.8) are in treatment group and 17 students (47.2) are in control group.

Hypothesis one. Analyzing the effect of mathematic instructional course ware on increase amount of learners' academic achievement (addition issue).

Table 2: the results of covariance for variable of mathematic mark in order to compare treatment and control groups

Variable statistics	Sample size	Pretest average	Post test average	The adjusted average	F	Free scale	significant level	*N* coefficient (Eta square)
treatment	19	5.5789	6.1579	6.160	4.566	32,1	0/04	./ 122
control	17	5.5882	5.9412	5.939				

The results of table 2 show that there are differences among addition issue of treatment group post test (6.160) and control group with The average adjusted (5.939) and F(32,1) that equals to 4.566 (at level p≤./05). So, according to this hypothesis (H_0) is rejected and hypothesis (H_1) is accepted. Eta coefficient is also equal to ./122 and it is obvious that 12% of dependent variable is because of applying independent variable of teaching through mathematic course ware.

Hypothesis two: Analyzing the effect of mathematic instructional course ware on increase amount of learners originality.

Table3: the results of covariance test for learners' ori]ginality variable in order to compare control and treatment *groups*

Variable statistics	Sample size	Pretest average	Post test average	The adjusted average	F	Free scale	significant level	*N* coefficient (eta square)
treatment	19	30.1053	51.1176	36.840	13.810	32,1	./03	./223
control	17	39.5294	36.2632	48.924				

The results of table3 show that there are statistically differences among the mark of originality of treatment group post test and control group with adjusted average (48.942) and amount of F (32,1) equal to 13.810 (at level p≤./05). So, the hypothesis (H_0) is rejected and survey hypothesis (H_1) is accepted. Eta square is also equal to ./223 and it shows that 22% of changes of dependent variable are because of applying independent variable i.e. teaching through mathematic course ware.

Hypothesis three: Analyzing the effect of mathematic instructional course ware on increase amount of learners fluency.

Table4: results of covariance analysis for variable of learners' fluency in order to compare control and treatment groups

Variable statistics	Sample size	pretest average	Post test average	The adjusted average	F	Free scale	significant level	N coefficient (eta square)
treatment	19	39.4211	55.9474	56.319	9.230	32,1	./042	./193
control	17	44.5882	39.4118	39.144				

The results of table4 show that there are statistically differences among fluency principle of treatment group post test with adjusted average (56. 319) and control group adjusted average (39.144) and F (32,1) equal to 9. 230 (at level p≤. /05). So hypothesis (H_0) is rejected and hypothesis (H_1) is accepted. Eta square is also equal to ./193 and it shows that 19 percent of the changes of dependent variable are because of applying independent variable of teaching through mathematic course ware.

Hypothesis four: Analyzing the effect of mathematic instructional course ware on increase amount of learners flexibility.

Table5: results of covariance analysis for variables of learners' flexibility in order to compare control and treatment groups

Variable statistics	Sample size	Pretest average	Post test average	The adjusted average	F	free scale	Significant level	N coefficient (eta square)
[treatment	19	38.5789	53.4211	53.922	11.230	32,1	./041	./187
control	17	44.3529	36.3529	37.610				

The results of table5 show that there are statistically differences among principle of flexibility of treatment group with adjusted average (53.922) and control group with adjusted average(37.610) with amount of F (32,1) equal to 11.230 (at level p≤./05). So, hypothesis (H_0) is rejected and hypothesis (H_1) is accepted). Eta coefficient is also equal to ./187 and it really shows that 18% of changes of dependent variable are because of applying independent variable of teaching through mathematic course ware.

Hypothesis five: Analyzing the effect of mathematic instructional course ware on increase amount of learners elaboration.

Table6: the results of covariance analysis test for variable of learners' elaboration in order to compare control and treatment groups.

Variable statistics	Sample size	Pretest average	Post test average	Adjusted average	F	Free scale	significant level	*N* coefficient (eta square)
treatment	19	26.4211	31.0526	31.809	6.230	32,1	./047	./169
control	17	36.4706	47.9412	44.299				

Table6 shows that there are statistically differences among post test elaboration of treatment group with adjusted average(31.809) and control group with adjusted average(44.299) with amount of F (32,1) equal to 6.230 (at level p≤./05). So, hypothesis (H_0) is rejected and hypothesis (H_1) is accepted. Eta coefficient is also equal to ./169 and it really shows that 16% of changes of depended variable are because of applying the independent variable of teaching through mathematic course ware.

4.Conclusion and discussion

The achieved results of these hypothesis show that mathematic course ware affects learners' academic achievement and creativity. Hypothesis one by previous surveys of Mojde Avar (2007) showed that using computer in teaching mathematic unlike traditional method causes students learning's increase and Sheikhzade and Mehrmohammadi (2007) showed in their surveys that new technologies such as computer and related domains and also multimedia, helps learning process. The second hypothesis by previous surveys of Kazemi (2005) showed that multimedia software can improve the students flourish of creativity and innovation and Lio (1988) showed in his survey that teaching via computer is meaningfully reflected in four factors of fluency, flexibility, originality, elaboration. The third and fourth hypothesis are related to Kalin,T & Mc Kata (2001) who showed in his survey applying simulation software affect creativity in two dimensions of flexibility, and fluency,. The fifth hypothesis is also related to previous survey of Lio in (1998), the researcher finds out in this survey that applying software and course ware of computer in teaching mathematic is a must because of tremendous advancement of science and technology and also the power that these tools have in accelerating, deepening, and conceptualization of mathematic. technology must be used as a cognitive tool for accelerating creativity, problem solving, analyzing and evaluation. So, it is recommended that some questions should be developed through new media and technologies of computer that challenge students and have them think deeply and show them new horizons

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